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THE CONTRIBUTION OF THE AROIDS —DASHEEN (*COLOCASIA ESCULENTA*), EDDOE (*COLOCASIA E. ANTIQUORUM*) AND TANNIA (*XANTHOSOMA SAGITTIFOLIUM*)— TO LIVELIHOOD AND NUTRITION SECURITY IN THE CARIBBEAN: THE CASE OF ST. VINCENT AND THE GRENADINES

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ABSTRACT: Traditionally, aroids [dasheen (*Colocasia esculenta*), eddoe (*Colocasia e. antiquorum*), and tannia (*Xanthosoma sagittifolium*)] have formed the basic staples of the diets of many Caribbean people, especially the rural poor. However, the westernization of diets has had an impact on the consumption of these more traditional aroids. This is evidenced by the continued increase in the Region's food import bill, estimated at over US$4 billion in 2010 (FAO, 2011). These roots and tubers contain complex carbohydrates, are high in fibre and have a lower caloric content than the imported staples. In addition, their production is dominated by rural small farmers. This makes them good candidates for a food and nutrition security plan that supports several farm families in the Region. It is recommended that the production and consumption of the aroids should be promoted in the Region as one means of reducing the Region's dependency on imported carbohydrates, the rising food import bill, and possibly to abate some of the ill effects associated with the "nutrition transition"(Durrant, 1987). This study attempts to examine these concepts by looking at a farmers' group in St. Vincent and the Grenadines in the Eastern Caribbean, which has successfully linked food and nutrition security while improving the livelihood of its farmers through the production and export of dasheen. The data shows an increasing trend in production and export over the period 2005–2010 and this impacted positively on agriculture's contribution to the country's gross domestic product.

INTRODUCTION

Traditionally, the roots and tubers group, of which the aroids are a part, formed the carbohydrate base of the diets for many of the Caribbean people, especially the rural poor. However, the westernization of diets has had a negative impact on the consumption of these more traditional crops. This is evidenced by the continued increase in the Region's food import bill, estimated at over US$4 billion in 2010 (FAO, 2011).

Over the last ten years, the Governments of Caribbean countries, including St. Vincent and the Grenadines, have actively embarked on an agricultural diversification program to reduce the reliance on the traditional production and export of bananas. This program has included renewed emphasis on root crops, including taro (dasheen) (McGregor et al., 2011). The authors also noted that this increased regional focus on crop diversification, coupled with increasing demand from Caribbean ethnic communities in overseas markets, has resulted in at least a five-fold increase in taro exports from the Region for the ten-year period.

Nigel Durrant (1987) stated, "Generally the production and consumption of indigenous roots and tubers have been declining over the last two decades and this trend has been ascribed to a wide variety of factors. Among these factors, the most important would seem to relate to the limited forms in which root crops may be consumed – given the low levels of processing technology". More than two decades since Durrant's statement, we seek to examine the contribution of the aroids to the livelihood and nutrition security of the people of St. Vincent and the Grenadines.

These roots and tubers contain complex carbohydrates, are high in fibre and have a lower caloric content than the imported staples. Despite their high starch content, edible aroids also provide other nutrients such as protein, potassium and calcium.

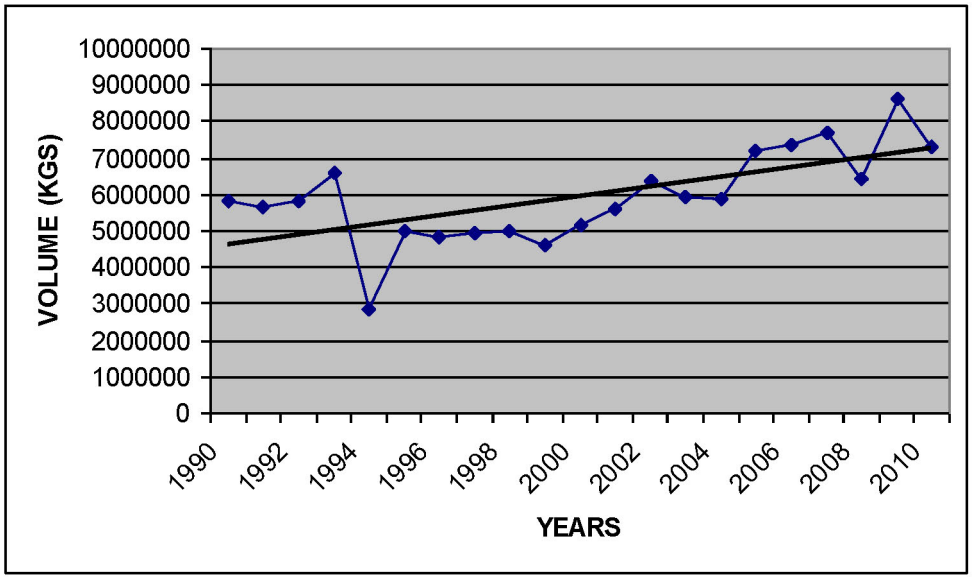
As in most of the Caribbean, the production of these roots and tubers in St. Vincent and the Grenadines (SVG) is dominated by rural small farmers, many of whom operate on marginal lands where many other crops will not thrive. This makes them good candidates for a food and nutrition security plan. Some development experts have recommended that the production and consumption of the aroids should be promoted in the Region as one means of reducing the Region's dependency on imported carbohydrates and reducing the rising food import bill.

This study therefore examines these concepts by reviewing the production and export of the aroids in SVG. An attempt is made to estimate the volume available for per capita consumption over the period 1990-2010. The contribution of dasheen production and export to the livelihood of some aroid farmers of St. Vincent and the Grenadines is also examined.

Trends in the production and export of aroids

The aroids, dasheen (*Colocasia esculenta*), which is also called Taro; eddoe (*Colocasia e. antiquorum*); and tannia (*Xanthosoma sagittifolium*) have a long production history in SVG. In recent years, in addition to the regional trade, dasheen has been exported extra-regionally mainly to the United Kingdom, Canada and France. In 2009, the latest year for which world production of Taro figures were available, SVG's production represented only 0.04% of the world production (FAOSTAT, 2012).

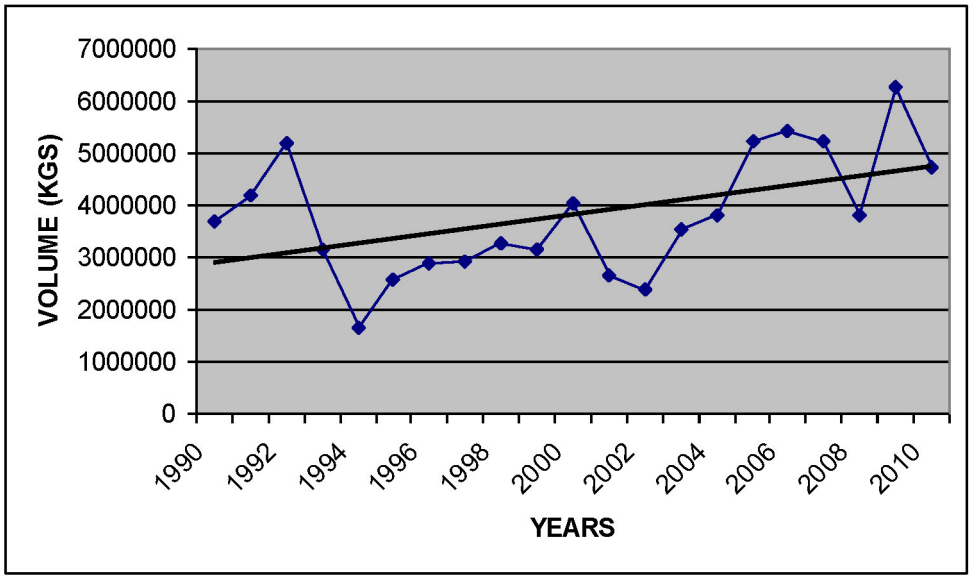
Figure 1 illustrates the production of the aroids for the period 1990-2010 for SVG. It shows that production fluctuated over the period. However, the trend line has a positive slope. Production in 2010 represents a 26% increase over 1990's production.



Source: Ministry of Agriculture SVG

Figure 1: SVG aroid production (kg) for the period 1990–2010

Figure 2 illustrates the volume of the aroids exported for the period 1990-2010. The lowest level of exports was recorded in 1994, which was also the lowest production year. Exports in 2010 represent a 29% increase over the export volume in the 1990s. In terms of value, exports in 2010 were 39% higher than in 1990 (EC$7,808,082 and EC$5,707,000, respectively). It should be pointed out here that in 2010, dasheen exports represented 54% of the value of aroid exports for St. Vincent and the Grenadines.



Source: Ministry of Agriculture SVG

Figure 2: SVG aroid exports (kg) for the period 1990–2010

Consumption patterns of aroids

Food security has been defined in many different ways. However, there appears to be some consensus of the three basic pillars:

- Food availability
- Access to food
- Food quality and appropriate utilization of food

Food availability relates to people having enough food grown so that the population of a country (in this case SVG) can be adequately fed. This study addresses food availability. However, as in most developing countries, the incidence of postharvest losses in SVG is high and, in the absence of a reliable estimate of the postharvest losses for the aroids, this factor is not included in the calculations.

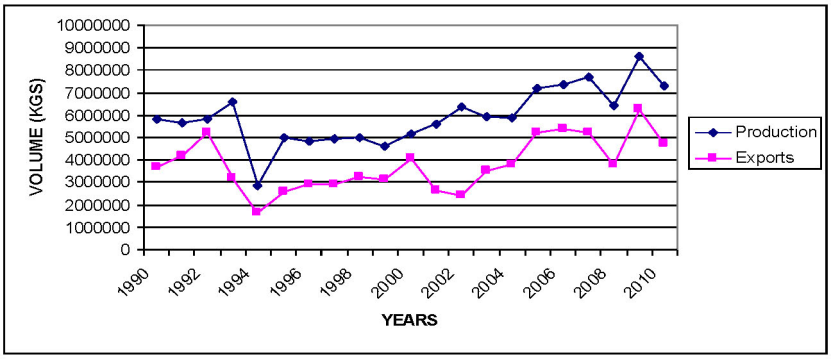
The following equation is used to estimate the availability of aroids for consumption:

CV = DP + I - E

where
CV = Consumption availability volume
DP = Domestic Production
I = Imports
E = Exports

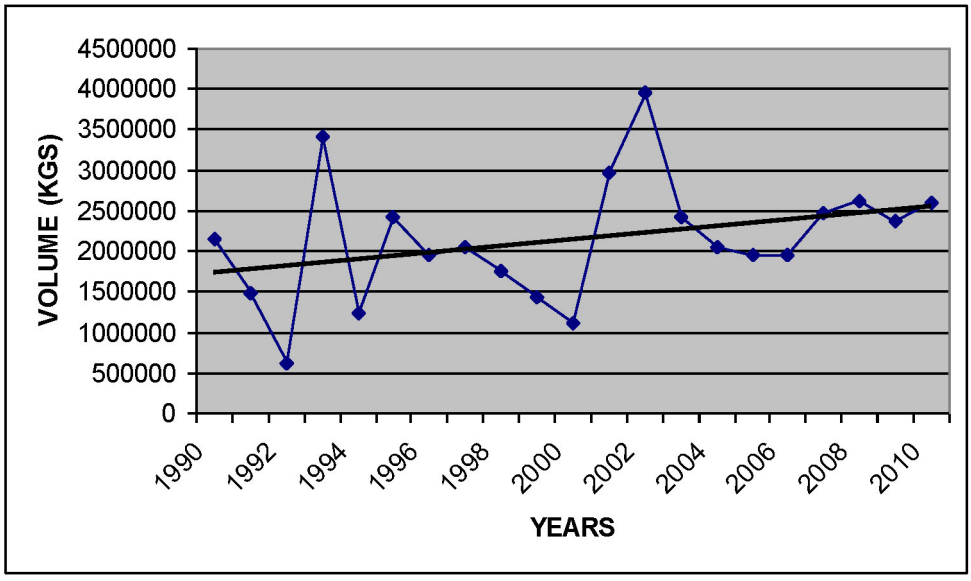
In the case of SVG, aroids are not normally imported, so this equation becomes: CV = DP - E

Figure 3 illustrates the production and exports of the aroids for the period 1990-2010. The area between the two lines represents the CV, that is, the volume available for local consumption. Figure 4 presents the same data for the period under review with a trend line added. As is observed in this graph, the volumes available for consumption fluctuated from year to year, with the highest level of aroids available for consumption in 2002 (3,959,550 kg). In 1992, the lowest level of aroids available for consumption was recorded (617,909 kg).



Source: Ministry of Agriculture SVG

Figure 3: SVG production and exports of aroids (kg) for the period 1990–2010



Source: Ministry of Agriculture SVG

Figure 4: SVG available aroids for consumption (kg) for the period 1990–2010

For the purpose of this study, per capita availability of the aroids for consumption is given by the following equation:

Per capita availability = Total available for consumption/total population

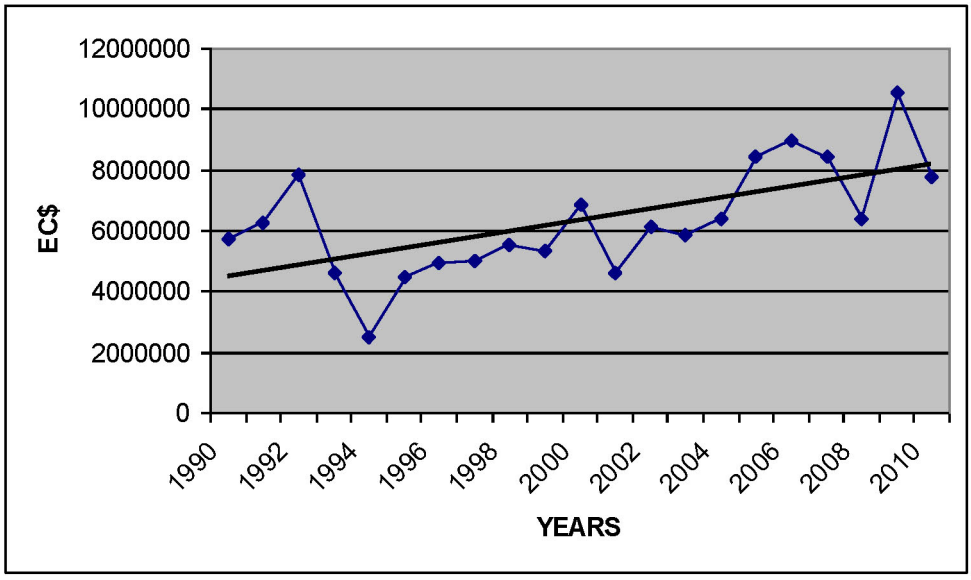
However, as is observed in Table 1, the per capita availability of the aroids in each year was higher than the availability in 1991. In 2010, the per capita availability was 86% higher than it was in 1991. From an availability perspective, the aroids were more available to the population in 2010 than they were in 1991.

Year	Total population	Total aroids available for consumption (kg)	Per capita availability (kg)
1991	106,499	1,480,091	14
2001	106,253	296,772	28
2005	100,747	1,962,184	19
2010	98,964	2,591,404	26

Table 1: Per capita aroid availability SVG for the period 1991 – 2010

Contribution of aroids to the country's economy

With the disappearance of preferential trading agreements in the 1990s, many Caribbean countries, including SVG, embarked on diversification strategies. The export of aroids to extra regional markets, such as the United Kingdom, was an option pursued by SVG. Figure 6 illustrates the export earnings from aroids for the period 1990-2010. As can be observed in this graph, there was a general increasing trend for the period. The export earnings in 2010 was 37% higher than in 1990. Therefore, the aroids have contributed to the economy overall for the period under review by earning valuable foreign exchange.



Source: Ministry of Agriculture SVG

Figure 5: SVG's export earnings from aroids for the period 1990–2010

Contribution of farmers' group

In St. Vincent and the Grenadines, the Farmers' group, Eastern Caribbean Trading Agricultural and Development Organization (ECTAD), has contributed significantly to the livelihoods of rural farm families by organising them into an entity through which they can benefit as members of a group**.** ECTAD is a registered, non-profit, rural development, farmer-based organization which was started in 1995. The vision is for farmers to operate their farms as businesses, thus improving the livelihoods of the mainly rural poor farm families. Areas of activities include capacity building of farmers, marketing and information sharing. The Organization operates through farm clusters within which farmers work together and support each other in production and marketing.

The group mainly collaborates with the Food and Agriculture Organization (FAO), Caribbean Agricultural Research and Development Organization (CARDI), and the St Vincent and the Grenadines Ministry of Agriculture.

ECTAD has five target crops: sweet potato, eddoes, dasheen, yams and ginger. To date, the most successful export crop has been dasheen. Export efforts began in 2004 in response to the need of neighbouring Grenada, whose agricultural sector was devastated by hurricane Ivan. The farmers from ECTAD supplied approximately 2,000 boxes (100,00 lb) of produce weekly to the Grenada Marketing Board. Inspired by this success, the Organization made trial shipments of dasheen to the United Kingdom in 2005. It was a collaborative effort of several entities, a local businessman provided boxes for the shipment; villagers facilitated packing and transport; and ECTAD organized financial support for shipping. The Technical Centre for Agricultural and Rural Co-operation (CTA) has funded training workshops in postharvest handling and packing. The price the farmers received increased from US thirty to seventy cents per pound.

In an attempt to gather information on the contribution of dasheen to the farmers' livelihoods, questionnaires were administered to a sample of 30 dasheen producers on the windward side of the island where dasheen production predominates.

The questions attempted to capture information on the length of time the producers were in dasheen production, their perception of the contribution of the undertaking to their income and standard of living, and the use of different production and marketing practices/options. Demographic data on age, sex and size of household were also collected. The analysis of the data was done using the statistical package SPSS.

Survey results

Of the 29 respondents that completed the question on gender, 15 were male and 14 female. None of the farmers were in the under twenty-five-year-old category. Over seventy percent of the farmers were between the ages of thirty-six and fifty-four. Also worthy of note is that only about seventeen percent were over fifty-five years old.

The respondents were predominantly members of ECTAD (>85%). Only one person was not a member of that group. Twenty-nine persons indicated the length of time they had been producing dasheen, with a minimum and maximum of three and thirty years, respectively. The average years in production were 15.59. The respondents each had more than a decade of dasheen production experience. All the respondents indicated that they grew dasheen for the market.

The responses suggest that production can be considered to be still in a traditional mode, without soil testing, or irrigation and in mixed stands (Table 2). In the case of labour for production and marketing, respondents used both family and hired help, with ninety-three percent of the respondents (N = 30) using family labour whereas ninety-seven percent used both. In the contemporary competitive agribusiness environment, most farmers will have their soil tested so that the appropriate fertilizer can be applied for the targeted crop.

Production issues	**% Yes**	**% No**
Crop grown as mixed stand	100	0
Crop grown as pure stand	0	100
Crop grown with irrigation	0	100
Crop grown by rain feed method	100	0
Do you test your soil before planting	0	100
Do you fertilize your dasheen	100	0

N = 30

Table 2: Production practices summarized

Ninety-three percent of the respondents identified price as a determining factor for their harvesting decisions. None of the respondents harvested their entire crop at once, and the availability of labour does not seem to influence harvesting decisions.

Seventy percent of the respondents (N = 30) thought that their income increased from the sale of dasheen. Further, eighty-seven percent obtained more than fifty percent of their income from

dasheen production and marketing and they also indicated that their standard of living improved as a result of dasheen production. This is an important finding when one looks at the average size of the household. Twenty-nine persons responded to the question pertaining to household size. The mean household size was five with a minimum and maximum of two and ten, respectively.

One important, noteworthy element of the programme was that the farmers eliminated the middleman and did the packing and postharvest handling themselves. This resulted in a higher price to the farmer. Since production and marketing activities were centralised in the villages, employment was created in the rural community. Farmers are now shipping in branded boxes labelled "Caribbean Small Farmers".

The export of dasheen from St. Vincent and the Grenadines has increased over the years, with the maximum export occurring in 2006. More farmers went into dasheen production, mainly because the main export crop, banana, was on the decline.

As the preceding data (Figure 3 and Figure 5) illustrate, dasheen production, export and earnings increased from 2004 to 2010, corresponding to the period when ECTAD farmers started producing and exporting.

The operation, which started out benefitting approximately 60 farm families, now impacts more than 200. Prices increased from EC thirty cents per pound to as much as EC$1.80 in the dry season when dasheen was scarce. The regional markets (mainly Trinidad and Tobago, Barbados and Grenada) were always important, but France and Great Britain became significant also (Table 3).

Table 3 Dasheen export from St. Vincent and the Grenadines 2006–2010 (kg)

	2006	2007	2008	2009	2010
United Kingdom	188,886	105,680	221,337	271,082	129,270
France	30,304	16,264	13,110	19,057	12,958
United States	111,174	110,150	40,878	98,460	51,170
Trinidad and Tobago	1,125,685	1,343,713	825,193	1,065,647	951,052
Barbados	22,825	23,260	16,152	17,420	14,751
Grenada	*60,756*	11,894	2,909	773	2,847

CONCLUSION

From the data presented, it could be concluded that there is a sufficient volume of aroids available for consumption by the population of St. Vincent and the Grenadines. Although large quantities are exported, a lot is consumed locally. The aroids, particularly dasheen, are making a positive contribution to the livelihoods of rural farm families. This was evidenced by the increase in prices to the farmer, employment opportunities generated and a general improved standard of living, where farmers could build houses and purchase vehicles (personal communication from the Secretary of ECTAD Group, Greggs). The survey also revealed a perception of a better standard

of living as a result of selling dasheen. It is hoped the farmers' group will be strengthened so that the farmers can continue to enjoy all the benefits that accrue from working together.

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